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Ohio Department of Agriculture

Animal Pest Control Guide

A Guide for Commercial Applicators - Category 9

Ohio Department of Agriculture Division of Plant Health Animal Pest Control Guide 2020

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CONTENTS

Livestock and livestock management 4
IPM 4
Applied controls 4
Environmental hazard 5
Insect resistance 5
Repellents 5
Control of flies in milk rooms 6
Control of flies in and around livestock buildings 6
Sanitation 6
Baits 6
Odor-baited fly traps 6
Electrocuter light traps and ultrasonic devices 6
Space or aerosol sprays (mist blowers or foggers) 7
Manure treatments 7
Residual surface sprays 7
Pests that breed and live in Liquid manure 7
Pesticides 8
Diatomaceous Earth 9
Using fly parasites with chemicals 9
Pests of cattle 10
Flies 10
Face fly 10
Heel fly larvae (cattle grub) 11
When to treat for cattle grubs 11
Follow instructions on the label 11
Horn fly 11
Stable fly 12
House fly 12
Horse and deer flies 13
Chewing and sucking lice 13
When to treat for cattle lice 14
Mosquitoes 14
Cattle scabies 14
Ticks 15
Life history of ticks 15
Lone Star tick 15
American dog tick 15
Spinose ear tick 16
Tick Control 16
Lone Star ticks and American dog ticks 16
Spinose ear ticks 16

Horses, mules & donkeys 17
Horse and deer files (see cattle section) 17
Lice 17
Bot flies 17
Bot fly management 18
When to treat for horse bots 18
Veterinary significance 19
Medical significance 19
Encephalitis in horses 19
Ticks 19
Poultry 20
Fly pests of chickens 20
House fly 20
The Lesser house fly 20
Black garbage Fly 21
Blow fly 21
Fly biology 21
Fly control in and around poultry houses 21
Other pests of the chicken 24
Northern fowl mite 24
Lice 24
Chicken mite 25
Bed bug 25
Flea 25
Darkling beetle 25
Hide beetle 26
Sheep and Goats 28
Sheep ked 28
Sheep lice 28
Sheep scabies 29
Nose bot 29
Wool maggot (black blow fly larvae) 29
Spinose ear tick 29
Swine 30
Flies 30
Hog lice 30
Mange mites 30

CHAPTER 1

Livestock and livestock management Learning Objectives

• Define and describe IPM
• When to treat for pests
• Pesticides and Resistance

IPM

Integrated pest management is the combining of appropriate pest control tactics into a single plan (strategy) to reduce pests and their damage to an acceptable level. Using many different tactics to control a pest problem tend to cause the least disruption to the living organisms and non-living surrounding at the treatment site. Relying only on pesticides for pest control can cause pests to develop resistance to pesticides. This can cause outbreaks of other pests, affect non-target organisms and cause damage to some surfaces. With some pests, the use of pesticides as the only tactic will achieve very poor control.

To solve pest problems you must:
• Identify the pest and/or pests and determine whether control is warranted for each
• Determine your pest control goal(s)
• Know what control tactics are available
• Evaluate the benefits and risks of each tactic or combination of tactics
• Choose a strategy that will be most effective and will cause the least harm to people and the environment
•.. Observe local, State and Federal regulations that apply to the situation

The strategy you choose will depend on the pest you have identified and the kind and amount of control you need.

Applied controls

• Biological control
• Cultural control
• Mechanical control
• Sanitation control
• Chemical control

Biological control involves the use of natural enemy parasites, predators and pathogens. You can supplement this natural control by introducing or releasing more of a pest's natural enemies into the target area or introducing new enemies that were not in the area before. Biological control usually is not eradication. The degree of control fluctuates. There is a time lag between pest population increase and corresponding increase in natural control. But, under proper conditions, sufficient control can be achieved to eliminate the threat to the animal to be protected.

Cultural control manure management is the most effective means for fly control. Fly breeding can be practically eliminated by reducing the moisture content to 30 percent or less or by the addition of moisture to liquefy it. Drying manure is preferred because it takes less space.

Mechanical control devices, machines and other methods used to control pests or alter their environment are called mechanical or physical controls. Traps, screens, barriers, fences, nets, radiation and electricity sometimes can be used to prevent the spread of pests into an area.

Lights, heat and refrigeration can alter the environment enough to suppress or eradicate some pest populations. Altering the amount of water, including humidity, can control some pests, especially insects and disease agents.

Sanitation practices help to prevent and suppress some pests by removing the pests themselves or their sources of food and shelter. Removing their breeding sites can reduce populations. Cleaning up garbage and other decaying debris also reduce breeding sites.

Chemical control pesticides are chemicals that destroy or mitigate pests, alter their behavior or prevent them from causing damage. Some pesticides either attract or repel pests. Chemicals that regulate growth or remove foliage are also classified as pesticides. Pesticides are generally the fastest way to control pests. In many

instances, they are the only effective tactic available. Source (Applying Pesticides Correctly OSUE)

Environmental hazard

An environmental hazard is a substance, state or event which has the potential to threaten the surrounding natural environment and/or adversely affect people's health. This term incorporates topics like pollution, natural disasters, storms and earthquakes.
Source (Wikipedia)

Insect resistance

Insect resistance to insecticides is a constantly growing problem. It happens as individually resistant insects survive, breed and pass on their resistant genes to their offspring. (A population of insects be¬comes resistant over a period of several generations.) Resistance develops more quickly under heavy doses of insecticides, incorrectly applied insecticides, or very frequent applications of the insecticides with the same mode of action. The type of insect pest makes a difference on how fast resistance can develop. With social insects, such as ants, resistance is seldom a problem since usually only the queen is reproductive. With non-social insects such as flies, each individual is capable of reproduction which can allow resistance to develop. The rate an insect develops will also affect the development of resistance. The life cycle of the house fly is usually only 8 to 14 days compared to an ant of about 10 to 12 months.

Different classes of insecticides have different pathways for resis¬tance development. Insecticides are broken down in the bodies of resis¬tant insects. Carbamate insecticides, resis¬tance occurs by one mechanism. Pyrethroid insecticides, three mechanisms of resistance have been identified making resistance development more likely to occur. Also, insect resistance to one insecticide can be cross-resistant to other insecticides of the same class or with other insecticides having a similar mode of action. With pyrethroids, the mechanism of cross-resistance is complex, but common. While no resistance has been identified for insect growth regulators (IGRs), the potential exists. An ideal application will kill as many insects as possible without under dosing or overdosing. THE ONLY PROVEN SOLUTION TO RESISTANCE PROBLEMS IS TO ROTATE THE USE OF DIFFERENT CLASSES OF INSECTICIDES.

Repellents

Insect repellents are not insecticides since the chemical action is to repel, not kill. However, some produce lethal effects if the concen¬tration is high enough and insects are unable to move away rapidly. The vast majority of insecticide use on horses is in the form of fly repellents. Many are also labeled for use against ticks, lice and other equine ectoparasites. Although often called repellents, labeled products may kill the pest as well. Horse owners spray on pesticides to repel flies. Usually house and biting fly populations around horses are high enough that killed flies are quickly replaced. So, the apparent efficacy (reduction of flies on the horse) is nil with products that just kill flies.

Control of flies in milk rooms

Milk rooms have specific challenges to take in to consideration when implementing fly control measures. Milk cannot be contaminated by flies or pesticides. The goal for the milk room is to be completely free of flies. This is achieved through an IPM approach that maximizes non-pesticide use. Manure storage should not be sited near the milk room. Doors to the milk room should have automatic closure and seal tightly. Entrance and exit from the milk room need to be minimized as much as possible. Sticky traps and tight screens can be used to prevent fly entry. Pesticide usage is restricted to formulations allowed by label law and all milking equipment should be covered and protected as directed by the label to prevent illegal contamination. Sanitation must be regular and complete.

It is vital to maintain a fly free zone in your milk room. Extremely small amounts of pesticides can be detected in milk, and their presence is illegal. Check with sanitary codes (federal and state) regarding legality of a pesticide in the milk room. It is illegal to use baits, residual surface sprays or space sprays other than those containing pyrethrins plus synergist or permethrin. For best fly control and to avoid illegal residues, use the following steps:

1. Reduce the number of flies entering the milk room by practicing strict sanitation and use recommended insecticides in dairy barns and premises.
2. Make sure good, tight-fitting screens are on the milk room doors and windows. Use screens, 14 to 16 meshes to the inch, made of copper, aluminum, bronze, plastic or rust-resisting materials. Keep spring-loaded doors shut at all times. Electric powered "air-curtain" fans will discourage flies from entering doorways.
3. Approved livestock and premise insecticides can be

used. Make sure to follow all label instructions.
4. Use sticky fly strips where appropriate.

Control of flies in and around livestock buildings

Good sanitation is the basis for all fly control programs. Sanitation is at least 75 percent of the fly control program by preventing fly breeding. Nevertheless, it is often necessary to supplement sanitation practices with pesticides.

For successful fly control, organize a control program that best fits your farm. A single pesticide product rarely gives effective and economical control. It is normally best to use a combination of pesticide products such as residual wall sprays, space or aerosol sprays, baits, etc. during the fly season.

Sanitation

a)Remove all manure from livestock pens as frequently as possible. Calf and bull pens holding animals require special attention. It is best to clean these pens once a week. Using sawdust instead of other materials for animal bedding will often reduce fly development. A clean livestock barn has fewer fly problems.
b) Spread the manure thinly outdoors to facilitate rapid drying which will kill fly eggs and larvae or stack waste and cover with a black, plastic tarp.
c) Eliminate silage seepage areas, wet litter, manure stacks, old wet hay or straw bales and other organic matter accumulations that may attract flies anywhere on the farm. Wet feed remaining at the ends of mangers will breed flies.
d) Provide proper drainage in barnyards. Use clean gravel and other fill to eliminate low spots in livestock yards. Proper grading and tiling can reduce wet barnyards. Keep water troughs and hydrants leak-free.

Baits

Fly resistance to certain chemical sprays means more reliance on baits or space sprays of other chemical classes. Although fresh bait will help control flies, results may be poor if fly breeding is excessive. Apply baits (moist) after floor litter and manure have been removed. Use baits liberally for best control. Apply a minimum of 4 ounces of bait per 1,000 square feet of floor area. Increase amounts when flies are breeding prolifically. Some insecticide formulations used in residual surface sprays have label directions for mixing a sweetener (sugar, molasses or corn syrup) to make your own fly baits or bait sprays. (Follow all label directions and safety precautions.) Most commercially packaged baits include sugar and a non-food fly aggregate attractant called Muscalure (Fly Stik, Muscamone). Baits are most effective when used in conjunction with other control measures. However, do not apply baits where livestock, poultry, dogs, cats, wildlife, birds or children may eat them. Do not contaminate feed or water.

Odor-baited fly traps

Commercial fly traps, using feeding and sex attractants or homemade fly traps using decaying meat or other foods, will capture large quantities of adult flies. However, these fly traps are limited in the usefulness and, when used alone, are not an effective method of controlling flies outside in livestock feedlots and premises over wide areas. Such traps sold commercially include Final Flight, Apache, Magnum, Big Stinky, Fly Terminator and others.

Electrocuter light traps and ultrasonic devices

Many types and styles of fly and mosquito traps are available on the market each year.

Some traps employ ultraviolet energy (black light) with an electri¬cally charged grid to kill insects. These electrical fly and mosquito “zappers,” when frying insects on the grid, can result in rather high electrical costs. Many kinds of insects, both harmful and beneficial, are attracted and killed that normally would fly out of the area if no light trap was present. One should judge a trap by the population of flies and mosquitoes remaining in the area and not by the amount caught. These traps should never be placed in doorways, windows, loading docks or other areas where concentrating these insects can become a nuisance. These traps may be helpful in small, tight, enclosed areas, especially indoors such as egg rooms, corners and stairwells where good sanita¬tion practices are followed. However, outdoors in feedlots, open-air sheds, barns and other livestock buildings and in areas of heavy insect and mosquito populations, traps are not effective in reducing numbers to satisfactory levels. These traps are more of an insect survey or monitoring tool than a control device. When used alone, they are not effective in and around livestock operations.

Certain outdoor lighting can concentrate un-wanted insects elsewhere. Mercury vapor lamps 150 to 200 feet away from buildings can divert nuisance insects away from high-traffic areas. By replacing a 100-watt mercury

vapor light (ultraviolet energy) with a 50-watt high pressure sodium vapor light, insect concentrations are effectively reduced.

Ultrasonic pest repellers are not effective in controlling insects. These devices generate ultrahigh frequency sound waves (ultra sound) that claim to be disruptive to the living, mating and survival insects. Research indicates that this sound, inaudible to the human ear and most insects, will not penetrate walls. In fact, the sound is high only at the source of output, falling off sharply beyond 15 feet and gone completely in 30 feet. Some studies have revealed that mosquitoes bite more frequently when the machine was turned on than when it was turned off. There is no difference in pest movement whether the machine is plugged in or unplugged from an electric source. Also, many insects cannot even hear the sound.

Space or aerosol sprays (mist blowers or foggers)

Space sprays or aerosols can be effective for rapid knockdown and kill of adult flies present during the application. Daily use of mist blowers or foggers may be necessary when used as the sole treatment. However, this may quickly lead to resistance. For best results, reduce air movement as much as possible by closing doors and windows. Animals may be present (if listed on product label) during application, but not directly treated. If animals were treated directly with a pesticide 24 hours earlier, do not treat. Avoid contamination of feed, water, milk, and milk utensils or use in milkrooms.

Manure treatments

Manure treatments (larviciding) applied directly to the manure surface to control fly maggots is discouraged because beneficial arthropods associated with the manure can be killed. Also, adding extra moisture to the manure can result in additional fly breeding with potential fly resistance increased. (Effort should be made to keep manure as dry as possible, less than a 30% moisture level, to greatly reduce fly breeding.) However, if manure cannot be kept dry or removed on a weekly basis, it is possible to use manure sprays. Use a hoe or trowel to sample the larvae present in the manure before treatment. Any "hot spots," where water has laid in the manure and containing many fly eggs and maggots can be spot treated with a low pressure knapsack sprayer or sprinkling can. Apply to wet the manure surface (not soak), and repeat applications as necessary but not more often than once every seven days. Avoid widespread use of manure sprays. Treating the edges of stacked manure before covering it with plastic can be helpful. Do not apply where animals or birds will come in contact with the manure. Do not apply treated manure to crops not approved on the insecticide label.

Residual surface sprays

Residual sprays last for a longer period of time than non-residual sprays. Non-residual sprays have no residual activity and are known as contact sprays. Residual surface sprays take longer to degrade. Residual sprays applied to walls, ceilings, partitions, stanchions, posts and other fly resting places are still the "mainstay" of fly control on livestock farms. These sprays are much more effective in stanchion barns than in loose-housing management where surfaces on which flies alight are minimal and buildings are very open. Barn surfaces vary in the amount of spray that should be applied to them. Smoothsurfaces require less spray than rough, porous surfaces. Thoroughly wet the surface to the point of runoff at low pressures of 80 to 100 pounds per square inch using a power sprayer or good proportioned type sprayer. Avoid contamination of feed and water. Cover drinking cups and mangers during spraying. Never spray in the milk house. Do not contaminate milk and milk utensils. Follow label directions.

Pests that breed and live in Liquid manure

Frequently during the warm summer months, rattailed maggots are reported as a nuisance pest migrating from livestock lagoons and manure pits. These creatures are not a problem as long as they remain in the liquid manure pit. However, they are known to move out

(Rattail Maggot Bugwood.org)

of the pit or lagoon in large numbers, contaminating livestock feed, accumulating in electrical boxes and causing short circuits and congregating in stacks of egg cartons and other unwanted places. The maggots migrate to a drier place for pupation.

Rattailed maggots are the larval or immature state of Syrphid flies, are about 1 ¼ inches long. The body portion is about ¾ inch long and the tail portion (breathing tube) is ½ inch long. These maggots are white-colored with the body portion and elongated, oval, cylindrical shape, which is wrinkled and semi-transparent, protracting into a long breathing tube (tail).

These larvae of the Syrphid fly live in highly polluted water such as livestock lagoons, polluted abandoned fish pools, foul pools and streams associated with barnyards, etc. Maggots are able to live in the water if sufficient solids are present as food. The adult flies resemble honey bees in appearance and are often seen "hovering" near the ground in the barnyard vicinity. These flies do not bite or sting humans and are considered beneficial because they are predaceous on aphids, etc.

Syrphid Fly image Bugwood.org

Pesticides

Disclaimer Clause-This publication contains pesticides that are subject to change at any time. It is always the pesticide applicator's responsibilit, to read and follow all current label directions for the specific pesticide being used.
Due to constantly changing labels and product registration, some pesticide products may no longer be legal when you read this study guide. If the information regarding the pesticides in this study guide disagrees with the current labeling, disregard the use.
No endorsement is intended for active ingredients mentioned, nor is criticism meant for products not mentioned. The author assumes no liability resulting from the use of these pesticides.

The following pesticides can be used either for all animals or the housing in this study guide.

Remember: the "Label is the Law" and must be followed.
Active Ingredient – Carbaryl 5% dust
Active Ingredient-Cyfluthrin 6 % ME
Active Ingredients- Piperonyl butoxid 2.5% S RTU
Pyrethrins 5% S RTU
Active Ingredients-Tetrachlorvinphos 23% RUP EC
Dichlorvos 5.3% RUP EC

EC = Emulsifiable concentrate
ME = Microencapsulated
RTU = Ready-to-use
RUP = Restricted use pesticide
S = Soluble Concentrate

The active ingredients listed above equate to many products. You can find these products on the NPIRS PUBLIC website at information retrieval system http://npirspublic.ceris.purdue.edu/npirs.html.

Diatomaceous Earth

No reliable scientific data exists that supports the claim of using diatomaceous earth (DE) as a feed additive to control livestock flies.

Diatomaceous earth is comprised of mineralized "shells" of one-celled aquatic plants called diatoms. Over millions of years, these diatoms died and settled to the bottoms of bodies of water. Now, these diatom "skeletons" are mined or dug to yield diatomaceous earth.

An insect's body covering, the cuticle, contains fat layers making cuticle nearly waterproof and preventing water loss. It is known that sorptive dust absorb fats, disrupting the cuticle's waterproof nature. Abrasive dusts damage the insect's water barrier by actually scratching or cutting the cuticle, resulting in "dehydration" usually causing the insect's death. The most effective sorptive dusts have been the silica aerogels (ammonium fluosilicate) and acid-activated clay. Dri-die, a silica aerogel has been used in urban pest control against ants, roaches and stored grain pests with some success. However, DE is far less sorptive than the silica aerogel with its effectiveness primarily from abrasiveness.

Although DE is labeled as a livestock feed-through for fly control, there is no specific data to support efficacy regarding control of internal parasites and specifically fly larvae in animal manure. Nevertheless, adult horn flies and face flies could move in from surrounding untreated herds and wild animals. DE may control some of the ectoparasitic lice, fleas and some mites if applied thoroughly and repeatedly.

Using fly parasites with chemicals

Although fly parasites are an integral part of a good Integrated Pest Management (IPM) program, insecticides will still play a role in your control program. Insecticide use should be restrained.

Fly parasites are tiny wasps that kill fly pupae. They attack only fly pupae in manure and are so small (similar in size to gnats) they go unnoticed by humans and livestock. Farmers make frequent releases of small numbers of these beneficial wasps to augment their existing populations of beneficial parasites. The female wasps seek out pupae, kill them and lay eggs within the dead pupa. These eggs hatch and turn into a new generation of beneficial parasitic wasps. Fly parasites are useful for the control of house flies, stable flies, blowflies and many other species. They cannot sting or bite humans.

CHAPTER 2

Learning Objectives

- Types of cattle
- Important pests of cattle
- How pests affect cattle

Pests of cattle

There are two types of cattle that will be discussed in this guide. They are dairy and beef cattle.

There are many types of pests of cattle. We will discuss some of the important ones in the following.

Flies

All flies undergo complete metamorphosis (change in form) with egg, larva, pupa, and adult stages in their development. The female fly deposits her eggs in animal feces, dead animals or moist organic material where the larvae, or "maggots," complete their development by feeding on bacteria associated with their developmental site. The maggots will pass through three larval stages increasing in size with each stage. When the maggots have completed their development and are ready to undergo the next step in their metamorphosis, they convert their last larval skin into a puparium, a hardened shell within which the pupa develops. Within the puparium, the pupa transforms into an adult fly, which pops off the end of the puparium and emerges. Body fluids are pumped into the fly's wing veins causing the wings to unfold and expand and allowing them to dry and harden so that the adult can fly. The rate of fly development is dependent upon temperature; and under optimal summertime conditions, flies may develop from egg to adult in as little as seven days. Once the female fly has mated, she can lay several batches of eggs, typically containing over 100 eggs each.

While humans commonly find adult flies to be the most bothersome life stage, the larval stage is the best target for management efforts. Elimination of larval habitat is the preferred method of pest fly suppression. By removing material in which the larvae develop, the life cycle of the fly can be broken, preventing subsequent production of adult flies. While chemical pesticides may be effective for suppressing adult fly populations in some situations, they are not a substitute for proper sanitation and aggressive elimination of fly developmental sites. Flies can quickly develop resistance to insecticides and house flies are now resistant to many of the pesticides registered for their management. Use insecticides only as a last resort to obtain immediate control of adult flies.
(Flies - Source University of California)

Clemson University-USDA Extension Bugwood.org

Face fly

Face flies have sponging mouthparts and are not capable of piercing skin. Adult face flies cluster around the eyes and noses of animals. These flies feed on animal secretions, blood from wounds, nectar and dung liquids. Face flies can transmit pink-eye and certain eye worms.

The life cycle from egg to adult is completed in two to three weeks in favorable weather.

Control is difficult due to the mobility of the flies and insecticides do not adhere readily to the animals face. Once insecticides are applied they are diluted or washed away. Daily hand treatment of animals or daily use of insecticides may aid in control.

Image Pest and Diseases Image Library
Bugwood.org

Heel fly larvae (cattle grub)

The Heel fly has one generation per year. They lay eggs on host animals. The larvae (grubs) enter the skin at the base of the hairs. After migrating to the gullet or spinal canal, the larvae move to the loin area. There they cut breathing holes through the hide and produce cysts (warbles).

The fully grown grubs emerge through the breathing holes, drop to the ground and pupate in the soil. Adults emerge during warm weather.

Systemic insecticides provide the best grub control. Apply treatment only as recommended and not after November 1. They can be applied as sprays, dips, pour-ons, spot treatments and feed supplements. To avoid harm to the treated animal, the systemic insecticide must be applied only at certain times during the fly's life cycle.

Follow the treatment cutoff dates for the region as listed on the label. Post-treatment symptoms from incorrect treatment may include bloat, inability to eat or take water, diarrhea, staggering, excessive salivation and partial hindquarter paralysis. Systemic insecticides cannot be used on milking dairy cattle.

When to treat for cattle grubs

Proper timing of treatment is important when using systemic grubicide pour-on, spot-on, or sprays on beef and non-lactating dairy cattle. Summertime treatments for cattle grubs usually provide two to three weeks of horn fly control. For the most effective results, cattle should be treated as soon as possible after heel fly activity ceases, but at least six weeks before grubs appear in the back, i.e., from July to the first killing frost (October). In Ohio, it may be best to treat after September 1 to avoid the risk of reinfestation. Do not treat after November 1 for cattle grubs. Do not treat on extremely hot days. Host-parasite reac-tions such as bloat, salivation, staggering and paralysis may sometimes occur when cattle are treated, especially in November and December when the common cattle grub, Hypoderma lineatum, is in the gullet, or when the northern cattle grub, H. bovis, is in the area of the spinal cord. Cattle should be treated either before or after these stages of grub development to prevent toxic reaction complications.

Follow instructions on the label

If it is impossible to determine the origin of the cattle, and thus the exact stage of the grubs is unknown, it is recommended that the cattle receive only dry hay or a maintenance ration of low energy a couple of days before and during the treatment period. This lessens the likelihood of severe bloat, which may occur in cattle on full feed when the common grub is killed in the gullet.

Horn fly

Craig Sheppard University of GA Bugwood.org

Horn fly is 3/16 inch long. Primarily injury is caused by sucking blood from cattle with long piercing/sucking mouth parts that are painful when bitten. Infested cattle react by licking their backs, twitching their flanks, switching their tails and kicking at their bellies.

Horn fly problems are limited to pasture and range cattle and not commonly a problem in building or feedlot situations. The economic loss from horn flies is greater than for other livestock pests.

Studies have shown that horn flies have their greatest effect on growing animals. The studies showed weaning weights of calves that have an average of 200 or more horn flies during the summer weigh less than the calves that are protected from horn flies. The same is true for yearling cattle. Horn flies can spread summer mastitis that affects the mammary glands of non-lactating cows and they have been implicated in the spread of anaplasmosis.

Adult horn flies spend most of their time resting or feeding on cattle. Female flies periodically leave the animals to deposit their eggs in fresh cattle manure. The eggs hatch and larval development occurs in the manure. Pupation occurs either in the manure or on the ground immediately beneath or around the manure. The entire life cycle from egg to adult is completed in 10 to 14 days. Horn flies overwinter as pupae in or beneath cattle manure.

Control is relatively easy since the fly spends most of its time on the cattle. Sprays are effective but require reapplication. Backrubbers and dust bags provide efficient control when used on animals daily. Ear tags impregnated with insecticide are a convenient method of control. Tags can be placed in both ears and may provide control throughout the summer.

Stable fly

The stable fly is a filth fly. The stable fly is ¼ inch long and grayish in color with distinct white areas on the head, a checkered abdomen and long piercing mouthparts. They feed by sucking blood and are vicious biters. Stable flies are primarily a pest of feedlot, dairy cattle, and equine. In the absence of these animal hosts, they will bite people and dogs.

Stable flies are typically outdoor, daytime biting flies. They are more active during the summer and fall months or after heavy rainfall. Both male and female

Whitney Cranshaw Bugwood.org

flies feed on cattle and usually attack the lower leg areas. Cattle will stomp their feet to try to dislodge the pest. Animals experience weight loss, reduced milk production and become unmanageable under extreme conditions.

The stable fly breeds in a variety of organic materials like silage, spilled feeds, animal bedding, manure and moist hay.

The larvae develop and pupation occurs within the organic materials. The life cycle is completed in 20-30 days. They are believed to overwinter as larvae or pupae in straw mixed manure.

Sanitation is the most important step in controlling stable flies. Frequent removal of animal waste and organic matter is essential. Chemical controls only work in conjunction with sanitation.

House fly

The house fly is similar to the stable fly in size and coloration. It is ¼ in long and has a white to yellow abdomen underside.

House flies do not bite but feed on manure and animal secretions through sponging mouthparts. They develop in decaying silage, spilled feeds, animal bedding, manure, moist hay, other forage and aquatic plants. The average life cycle takes 10-20 days to complete. They overwinter as larvae or pupae. Adults may survive in heated buildings.

House fly populations increase in the spring and summer reaching a maximum number in the late summer or early fall. Their presence can cause reduction in production efficiency.

Sanitation is the key step in control of these flies. Disposal of animal wastes and organic debris is essential. Chemical control works only when used in conjunction with good sanitation practices. Use directed sprays to apply persistent insecticides to fly resting areas, such as fences, feed bunks, buildings and vegetation. Space sprays by ground or aerial application may also be effective. Milk regulations limit pesticides that may be used.

Clemson University – USDA Extension Bugwood.org

Horse and deer flies

Horse and deer flies are common biting flies of cattle and horses. The females are strong fliers with painful bites. The bites usually continue to bleed after the fly leaves. Several horse flies exist ranging in size from 1/3 inch to 1 inch in length. These are day biting pests that cause production losses.

The life cycle can range from 70 days to two years. Immature stages live in aquatic or semiaquatic places. Control of these flies is difficult because they may migrate over long distances and they do not stay on the host long enough to be controlled by residual sprays. Some repellents give two to five day control.

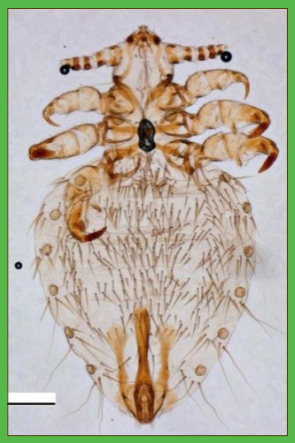
Chewing and sucking lice

Chewing (biting) and sucking lice can infest cattle. Lice are small, wingless, tough skinned, flattened, usually dark colored external parasites. Most are not easily seen by the naked eye. Chewing lice feed on unhealthy skin and feed on blood making them a serious pest. The feeding of lice can cause an intense irritation leading to scratching, rubbing, licking and biting of infected areas. Heavy infestations may result in reduced production, loss of revenue and anemia.

Lice are host specific and spend their entire life cycle on the animal. They hatch from eggs (nits) deposited on the hair. They hatch into nymphs. Nymphs resemble adults except in size. Development from egg to adult is about 30 days. Lice are spread by direct contact with infested animals. Some animals are carriers in herds and can infect the entire herd again.

Most louse populations are greatest during cold weather months. Cattle tail lice are more numerous during summer.

Control of lice with sprays can be successful. Complete wetting and thorough coverage are essential and repeat application may be necessary. Dust treatments may be used in cold weather.



(Lice) Pest and Diseases Library Bugwood.org

When to treat for cattle lice

Systemic pour-on & spot-on and Ivermectin pour-on & injection for lice control on beef and non-lactating dairy cattle are convenient because Ohio winters are often very cold, preventing spraying or dipping. Grub treatment before Ohio's Novem-ber 1 cutoff date will effectively treat the cattle. Louse eggs are not susceptible to insecticides and therefore, animals should be reexamined about three weeks after treatment to determine if viable lice eggs have hatched and reinfected the herd.

For cattle previously treated for grubs, a second treatment later in the season may become necessary should lice become a problem. The second treatment should not be applied sooner than 35 days after the first treatment. Be sure to follow instructions on the label for any safety precautions.

Mosquitoes

(Mosquito) David Cappaert Bugwood.org

Adult mosquitoes are small, fragile insects with slender bodies, one pair of narrow wings and three pairs of long slender legs. They vary in length from 3/16 to ½ inch (5mm to 13 mm). Mosquitoes have an elongate proboscis with piercing mouthparts with which the female bites and feeds on blood. Male mosquitoes feed mostly on plant nectar.

Mosquitoes can carry and transmit many bacterial and viral diseases to animals and humans. Some diseases are very serious and may affect efficiency of animal meat and milk production.

The life cycle of mosquitoes vary greatly, depending on the type of mosquito and the environment. The female lays eggs on or just above the water line and in areas subject to flooding. The larval and pupal stages develop in water then the adult emerges from the pupa.
The best control method is to eliminate standing-water areas such as potholes, water tanks, unused receptacles and other man-made containers, which can act as breeding sites.

Insecticides are available to control both larvae and adults. You can control mosquitoes with directed sprays or by use of foggers and ULV applicators. Use them in mosquito resting areas such as open barns and sheds, weeds, grass, trees and shrubbery.

Cattle scabies

Scabies is a contagious disease of cattle caused by tiny parasitic mites living on or in the skin. Intense inflammation is caused by the saliva of the mite. Severe weight loss, reduced milk production and even death may occur.

Scabies infested animals are also more susceptible to other cattle diseases. Transmission is by direct contact with infested animals or contaminated material. Lesions may occur anywhere on the body with the neck, shoulder and head being the most likely locations. Scabies is regulated by federal quarantine laws. Animals with scabies should be removed from the herd and the veterinarian contacted immediately. Two treatments 7-10 days apart are required to control cattle scabies.

(Scabies) Tatvet.com.au

Ticks

(Tick) Bugwood.org

Ticks are parasites of cattle. They can transmit diseases. In addition, loss of blood and injection of toxins during tick feeding affect animal health weight gains and milk production.

Correct identification of ticks is very important for economical and effective control. A heavy infestation of ticks on cattle results in a failure to gain weight properly and a severe degree of anemia. Tick bites are irritating and cause the infested animal to rub and scratch, resulting in a scabby skin condition sometimes followed by a secondary infection.

Ticks usually feed on wild animal hosts during high populations in the vicinity of treated cattle herds. Ticks produced on wildlife can re-infest treated cattle, and they continually pose a problem for cattle producers. Ticks are also capable of transmitting diseases such as anaplasmosis to cattle.

Life history of ticks

There are four stages in the life cycle of ticks: the egg, the six-legged larva or seed tick, the nymph and the adult which has eight legs. The larva, nymph and adult obtain food by piercing the skin of animals and sucking blood. Eggs are laid on the ground, not on the host animal. The most important tick pests of cattle are the Lone Star tick, the American dog tick and the soft tick known as the Spinose ear tick.

Lone Star tick

This tick is commonly observed on cattle. Large populations of this tick can cause considerable problems to cattle and humans. The long mouthparts cause deep, irritating wounds. During heavy infestations, animals suffer severely from the bite and may develop an anemic condition from loss of blood. The favored attachment sites on cattle include the perianal region, udder or cod, dewlap and loose skin about the belly and leg attachments.

The female Lone Star tick has a solitary white spot on the back. Males are smaller than females and have several white spots scattered on the back. Larvae (seed ticks) and nymphs are brown and have no distinctive markings. A life cycle requires about a year to complete. American dog tick

(American dog tick) University of Florida

(Lone Star tick) Rose Pest Control

This tick occurs in grassy brush covered areas. High humidity favors this species. Dogs are the preferred host of the adult, but it has been recorded on numerous wild and domestic animals as well as man. Larvae and nymphs prefer small rodents. This tick may cause annoyance to domestic livestock, but it is not a known vector of cattle disease. It is important not only because its bite is annoying and because it is a vector of Rocky Mountain spotted fever and tularemia, but also because its bite sometimes causes paralysis in livestock and man. The life cycle usually takes about two years, and adult activity is noticeable from May until September.

Spinose ear tick

studyblue.com

Parasitic larvae and nymphs of this species cause serious damage to livestock. They attach in the inner folds of the outer ear and suck blood. The wounds may become infected with pus-forming organisms that give rise to a condition known as canker ear. The constant irritation causes animals to become dull, unthrifty and even lose weight. Infested animals shake their heads and rub their ears in an attempt to relieve the irritation. The ticks are not vectors of disease.

Infestation is spread by introduction of an infested animal or animals into previously uninfested herds. Bulls and replacement heifers that are to be kept for some time are most likely to be involved. Since the nymphs may remain in the ear for four months, any animal kept on a farm for that period of time could provide the source for infestation of the whole herd.

Tick Control

Ticks thrive in high humidity conditions. Regular weed and brush control in pastures decreases humidity and greatly reduces tick populations. Use only recommended insecticides on cattle and follow label directions carefully. Do not treat sick or weakened animals and avoid treating young calves unless the pesticide is registered for such use.

Lone Star ticks and American dog ticks

Use one-half to one gallon of spray mix per animal when treating for Lone Star Ticks or American Dog Ticks. Remember to reach hard-to-spray areas around the tail and head, and beneath the body. Treat cattle every two to four weeks from May through mid-September.

Spinose ear ticks

Insecticidal ear tags are the most economical and labor-saving control procedure for this pest. Puff dusters and liquid insecticides in mineral oil are also effective in control. About one teaspoonful of insecticide oil solution should be placed in each ear.
(Ticks - Source: University of Arkansas)

CHAPTER 3

Horses, mules & donkeys

Learning Objectives

- Pests of horses, mules and donkeys
- How these animals are affected

Horse and deer files (see cattle section)

Lice

For descriptions, refer to cattle Section.

Damage includes loss of hair, really rough skin and irritability of the animal.

Animals may become unmanageable and may injure themselves.

Pesticides can be applied as sprays, dusts, washes and wipes.

Bot flies

The three main species are nose, chin or throat, and common horse bots. Bots are highly specialized parasites that attack horses, donkeys and mules. Common bots do not attack cattle, sheep, goats or other farm animals even though they may be grazing in the same pasture with horses. If the horses are removed from such a pasture, the bot flies will die without laying their eggs on the other animals.

Bots attach the eggs on the nose hairs, mouth hairs or other areas on the horse. These three bot flies are serious pests of horses and mules, etc. They are known as the common horse bot fly or nit fly (Gasterophilus intestinalis); the throat bot fly or chin fly (G. nasalis); and the nose bot fly, or nose fly (G. haemorrhoidalis).

Bot fly eggs on horse

The common horse bot fly and the throat bot fly occur throughout the United States wherever horses are found, but they are much more numerous in some localities than in others. Throat bot flies are extremely abundant in the drier parts of the country and at higher altitudes above 3,000 feet. The throat bot is not as widespread as the common bot or nose bot. It is likely due to unfavorable climatic conditions.

Horse bots can cause high levels of annoyance, especially true of the nose bot fly which lays its eggs on hairs around the lips of horses. The animal attacked can react violently; it may toss its head in the air, strike the ground with its front feet and rub its nose on the ground or barbed-wire fence.

The common bot lays its eggs on the horse's body on single hairs. The eggs are laid on front legs, abdomen, flanks and shoulders. The eggs hatch into maggots and the larvae crawl to the mouth or are licked and ingested by the animal. The larvae migrate to the stomach where they remain until maturity. Much of the damage caused by bots is in the mouth and digestive tract of horses.

Like other flies, horse bots pass through four distinct stages: the egg, larva, pupa, and adult. The adult bot

flies are unable to consume food. Enough is stored up in their bodies as a larva to develop the 150 to 300 eggs to be deposited during the short life of the adult fly, whose sole purpose is reproduction. During favorable weather many eggs can be laid in a short amount of time. Reference (Information usda/download)

Bot fly management

Mechanical control manure should be cleaned and transported away since this is the area where the final development occurs before the fly emerges. Bot eggs can be removed from the horse's body by several methods. A tool with a sharp edge or a form of sand paper can be used to scrape away the bot eggs. Warm water with appropriate insecticide can be used to induce the eggs to hatch and kill the larvae. The first stage larvae die soon after hatching if they do not reach the mouth. Protection, such as rubber gloves, help in preventing larvae from entering the handler.

Chemical control an insecticide can also be applied weekly during the peak egg laying season to the areas of the body covered with bot eggs. Oral medications can be used to reduce the numbers of larvae inside of the stomach. Commonly used medications include avermectins, which come in different formulations: liquids, gels, boluses, and feed additives. Avermectins work to control the adult and larval fly stages. The horse should be treated within one month after eggs are seen during the early summer months. A second treatment should be administered in the fall to control the second and third stage larvae.

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Catts EP, Mullen G. 2002. Myiasis (Muscoidea, Oestroidea). 318-347 pp. In Mullen G, Durden L. (editors). Medical and Veterinary Entomology. San Diego, CA. Academic Press.

Cogley TP, Cogley MC. 2000. Field observations of the host-parasite relationship associated with the common horse bot fly, Gasterophilus intestinalis. Veterinary Parasitology 88: 93-105.

When to treat for horse bots

Traditionally, the most effective treatments to control horse bots have been applied at least 30 days after the first killing frost. Some authorities believe a second mid-winter treatment is needed to "clean" the animal from any remaining bots. (Your veterinarian can best advise you on a workable program to fit your circumstances.) Bots, not true worms, are the larval stage of bot flies. Bot flies are active from midsummer until the first killing frost. Adult bot flies, resembling honey bees in appearance, may cause animals to instinc¬tively fear them. Females, unable to feed or bite, lay 150 to 300 eggs in a life span of 7 to 10 days. Eggs (pale yellow, pinhead sized) are deposited on the forelegs, chest, neck, belly, and occasionally flanks or hind legs of the animal.

Eggs accumulate until adults are killed by frost and can remain viable for several months. Eggs incubate in one to two weeks and hatch only if licked or eaten.

Sponging the animal with warm water (104°F to 120°F) on cool days (less than 60°F) will cause eggs to hatch and then die of exposure. (Firm rubbing is important.) Also, clipping hairs infested with bot eggs will aid in control. Currently available commercial products are very effective for control of bots. The use of sponging or mechanical/clipping removal of bot eggs should be viewed only as a supplement to your bot control program.

Veterinary significance

The horse bot fly causes indirect damage to the horse through attempts at egg laying. The dive-bombing action of the bot fly can range from a simple annoyance to severe fright among horses. Injuries may result as the horse tries to rid themselves of this hovering fly. Weight loss may occur if the annoyance is great enough to cause the horse to stop grazing.

The direct damage the bot fly causes occurs after the larvae enter the animal's mouth and gastrointestinal tract. When the first instar larvae burrow into the mouth, the horse may experience severe irritation, as well as the development of pus pockets and loosened teeth. Loss of appetite may develop due to the larva's inhabitance (Mullen and Durden 2002).

As the second and third instar larvae inhabit the gastrointestinal tract and attach to the stomach and intestine, multiple complications may arise. Larvae present in large numbers in the stomach can cause blockages and lead to colic. According to Mullen and Durden (2002), horses are capable of tolerating an infestation of 100 larvae. Large numbers of larvae impact the host by damaging the tissue of the stomach or the gut lining and consuming the nutrients that would otherwise be beneficial to the hosts' well-being. Other health issues that may develop due to a severe infestation of these larvae include: chronic gastritis, ulcerated stomach, esophageal paralysis, peritonitis, stomach rupture, squamous cell tumors, and anemia Reference (Pfizer 2007, Williams and Knapp 1999).

Medical significance

The horse bot fly occasionally can cause what is called ocular myiasis, or invasion of the eye by first stage larvae. Although these cases are rare, they often occur in individuals handling horses that have bot fly eggs on their hair. Occasionally, these bot fly larvae will enter the eye rather than reside on the surface as is more common with the sheep nose bot, Oestrus ovis. Linnaeus an additional rare form of horse bot myiasis is called cutaneous myiasis. In this case, hatching larvae enter the skin of humans and begin burrowing through the skin causing visible, sinuous, inflamed tracks accompanied by considerable irritation and itching (Catts and Mullen 2002). Anyone working with horses during bot fly season should be familiar with the risks and take appropriate precautions (do not rub eyes after combing or washing animals and wash hands when finished).

Encephalitis in horses

Encephalitis is a viral disease affecting horses, mules, donkeys and humans. It is transmitted by the bite of mosquitoes and possibly other insects. In horses, the central nervous system is affected, often resulting in high mortality, whereas in humans the infection usually produces mild to severe respiratory illness.
Signs of encephalitis in horses include a rapid rise in body temperature, up to 106°F, with a rapid pulse, loss of appetite and depression. The animal displays a "drifting gait." It may hang its head, appear drowsy, press its head against objects and assume a cross-legged stance. Commonly, the animal may circle continuously to exhaustion with death occurring in six to eight days.
For suspected cases of encephalitis, contact your local practicing veterinarian. The Ohio Department of Health can analyze for this disease.

Consult your veterinarian regarding an equine vaccination program for protection against encephalitis.

Ticks

Most equine ticks are similar to cattle ticks. Refer to the section under Cattle.

CHAPTER 4

Learning Objectives

- Pests of poultry
- How pests affect poultry
- Water and manure management
- IPM

Poultry

One of the largest management problems facing the poultry producer of today is fly control. The shift from many small farm flocks to fewer large poultry operations has greatly increased fly problems by providing concentrated breeding areas in large volumes of waste that cannot be removed frequently. As urbanization increases, poultry producers are faced with pressure to reduce fly populations. Fly populations (manure breeding flies) may cause a public health nuisance, resulting in poor public relations. An effort to achieve an acceptable level of fly control is necessary.

There are several kinds of flies common in and around poultry houses. Probably the most common are the house and lesser house flies. 95% of the problems involve the house fly. Both of these flies can travel up to 20 miles from the site of development.

Fly pests of chickens

House fly

House flies are about ¼ inch long and breed in moist decaying plant material, refuse, spilled grains and feed and in all kinds of manure. House flies are more likely to be a problem around poultry houses where sanitation is poor.

These flies prefer sunlight and are very active crawling over filth, people and food products.
This fly is an important mechanical vector of many human and poultry diseases (protozoa, bacteria, viruses, rickettsia, fungi and worms) and can cause fly-specking problems with eggs as well as windows and walls of buildings.

House flies are the intermediate host for the common tapeworm in chickens. They carry millions of bacteria.

House fly Bugwood.org

The Lesser house fly

The Lesser house fly is about 3/16 inch long, smaller than the house fly. This fly prefers a less moist medium than the house fly in which to lay eggs to reproduce. Poultry manure is preferred over most other media. This fly prefers shade and cooler temperatures and is often seen circling aimlessly beneath hanging objects in the poultry house, egg room and feed room.

The Lesser house fly does cause persons living near poultry establishments to complain about fly problems. It may hover in large numbers in nearby garages, breezeways and homes because it prefers shade.

Black garbage Fly

The black garbage fly is slightly smaller than the house fly. The shiny bronze-black colored wings are held straight back. This fly tends to stay on the food source at night rather than resting on the ceiling or outdoor vegetation, as does the house fly.

The female seems to have limited flight activity, but has been found about five miles from its breeding area. Although black garbage fly larvae have been known to exterminate house fly populations, they should not be considered entirely beneficial due to the potential increase of population numbers on the farm and the ability to disperse as adults in nearby communities.

Flicker.com

All stages are found throughout the year under suitable conditions with rather good tolerance to cold weather. The life cycle is similar to the house fly.

Blow fly

Blow flies sometimes known as green or blue bottle flies are slightly larger than house flies and sometimes occur in poultry houses.

They prefer to breed and reproduce in decaying animal and bird carcasses, dog manure, broken eggs and wet garbage.

Generally, a good sanitation program will hold these flies in check.

Fly biology

All flies pass through four stages: egg, larva, pupa and adult. Adult flies deposit small, white oval eggs on the breeding media and creamy white larvae (maggots) develop in the moist (wet) material.

Mature maggots crawl out of this material and move to a drier place for pupation. The brown seed-like puparia finally yield adult flies.

Flies in the poultry house can be present the year round if there are warm temperatures and no true diapause.

Fly control in and around poultry houses

Cultural Control manure management is the most effective means for fly control. Fly breeding can be practically eliminated by reducing the moisture content to 30 percent or less or by the addition of moisture to liquefy it. Drying manure is preferred because it takes less space.

Dry Manure Management frequent removal of manure (at least weekly or more) prevents fly breeding because it breaks the fly breeding life cycle. It is important to scatter the manure lightly outdoors to kill the eggs and larvae by drying. Avoid piling or clumps of manure. Adequate land is needed to spread manure.

You can speed up the manure drying time by providing 2X3 inch slates spaced at three-inch intervals running lengthwise about 15 inches under each cage. The additional exposed surface causes droppings to dry more quickly and to accumulate in cones in narrow rows.
In-house storage of manure requires drying the manure to a 30 percent moisture level and maintaining this level where sufficient storage space is available. Dry manure can be held for several years. Any practice that limits moisture in the droppings or aids in rapid drying is important for fly control.

Water Management prevents leaks in water troughs or cups. Regulating water flow to an on/off cycle may help eliminate the moisture problem.

Provide abundant cross ventilation beneath the cages, especially during hot weather. Thirty-six inch pit fans blowing across the manure is good. Adequate house ventilation is important at all times.

If the water is high or there is a danger of water flooding the house from the outside, adjust the floor-grade relationship so that the house floor is higher than the outside. Have surface water run away from the building. Drain and fill all low areas around the houses.
Prevent dysentery by keeping waters clean. Use recommended antibiotics if dysentery develops. Avoid laxative feed rations. Avoid excessively high temperatures that encourage abnormal water intake. Practice good husbandry by restricting excess water consumption. There are new housing systems designed to dry manure in the pits.

Sanitation is an important aid in successful fly control. Certain conditions in and around the poultry operation will encourage fly outbreaks. They must be eliminated.

Sanitation actions to follow:
Quick removal and disposal of dead birds and broken eggs will help with control. Dispose of far away from the poultry premises, by burning in an incinerator, deep ground burial or through commercial garbage collectors at least weekly during summer months.
Cleaning up and disposing of feed spills and manure spills especially if wet. Reduce feed spills. Clean out weed choked water drainage ditches. Install proper eave troughs and downspouts on poultry houses to carry water away from buildings. Provide drainage in poultry yards. Minimize sources from other fly-infested animal operation in close proximity to the poultry house.

Biological Control is the use of naturally occurring enemies of manure breeding flies. Flies are destroyed in the pupa stage. The parasites are very tiny wasps. They are about the size of the head of a house fly. The wasps live in the manure feeding on the fly pupa. Adult female parasites lay an egg on the fly pupa within the puparium. Then the developing parasite larva consumes the pupa and emerges as an adult parasite.

These fly parasites are specific to flies and do not attack anything else. They are biteless and stingless to humans and go unnoticed. They self-propagate in the process of controlling pest flies. However, due to low parasitism levels, mass releases are needed. Also, each wasp lays fewer eggs than each fly of the same time period, making it necessary to start with an initial wasp release with weekly supplemental releases following. Releases occur before and during fly season. Chemical sprays must be discontinued in areas of the poultry house when these wasps are used.

Use of fly parasites for biological control in Ohio would reduce chemical residues to humans, birds, eggs and the environment. However, to date claims that wasps will provide long-term fly control is not always backed up by scientific research results. Remember to manage the habitat for biological control by keeping manure dry. Remove manure for clean out only during the fly-free time of the year and eliminate insecticide sprays in the manure pits.

Other parasites that can be used in both broiler and layer operations are Macrochelid mites, Uropodid mites and Hister beetles. The Macrochelid mite is reddish-brown, less than 1/16 in long and feeds on both house fly eggs and first-instar larvae. These mites found on the outside layer of manure can consume up to 20 house fly eggs per day. The Uropodid mite feeds on first-instar house fly larvae deeper in the manure.

The Hister beetle is black, about 1/8 inch long and feeds on house fly eggs and first-instar larvae. This beetle predator, common in both broiler and layer houses, can consume 13 to 24 house fly eggs per day. Both adult and immature Hister beetles live in the surface layers of manure. Also, another type of Hister beetle is present at lower numbers on northeast poultry farms.
Mechanical Control a paint roller sometimes can be a helpful tool used to crush concentrations of newly emerged flies, reducing the use of pesticides. It takes newly emerged flies 24 hours before they can fly.

Operate manure scrapers every time the feeders are operated to effectively scrape fresh manure droppings down into the pits.

Many types and styles of fly traps appear on the market each year. These traps are usually electrical, employing a black light with an electrically charged grid to kill the insects. Some traps are baited with a fly attractant material.

Traps can be helpful in tight enclosed areas such as egg rooms, where there is a breeding fly population. However, in areas of heavy populations traps are not as effective.

Use good tight screens on the poultry house doors and windows. Use screens 14 to 16 mesh to the inch. Copper, aluminum, bronze, plastic or rust-resisting screens are best.

Use a fan to blow air through a screened doorway from the egg room or other work area. Flies will not move against the wind.

Use sticky fly strips where appropriate.

Surveillance is important to monitor fly populations in order to make wise control decisions. Visual observations alone can be misleading. One needs to know the fly's behavior patterns and history. Documentation is very helpful in legal defense if needed.

Moving tape count is the best surveillance method taking about five minutes each day walking on a 1,000 foot walk to catch 25 to 75 flies. Walking down and back in each house is cheap and easy. Use the same pattern, the same time each day, when carrying sticky fly tape.

Sticky fly tapes that hang, often tell nothing. Tapes will fill up fast during the summer months within a chicken facility. The species of fly can be determined from these tapes. Captured flies are counted weekly and ribbons replaced. A weekly count of 100 or more per ribbon may indicate fly control is required. Ribbons are messy and location is important.

Speck fly count will require a three by five index file card fastened flush against feed troughs, ceilings, braces or other fly resting areas and left for a period of several days to a week, to provide documented evidence as to the number of "fly specks" counted on a given date over a period of time.

Baited jug trap is more expensive than other sampling methods, but offers greater sensitivity to fly population changes. A plastic milk jug, with four access holes (two inches diameter around the upper part of the jug) with a wire attached for hanging about three feet from the floor around the pit periphery, may indicate need for control. The jug can be baited with fly bait.

Larval sampling is important to walk the pits to look for hot spots. Look where the manure appears flattened, wet and contains heavy populations of fly eggs and maggots. Take a hoe or trowel to sample the larvae present. Keep pits walkable, clean and water-free. "Hot spots" usually appear where water has laid in the manure. Some may carry a sprayer to treat the hot spots to halt excessive fly larval breeding. Pit should appear tall, narrow, capped and dry with perhaps beetles present to assist in aerating the manure making it drier.

Chemical Control residual sprays usually are a more effective and economical method for controlling potentially heavy populations of adult flies. These sprays should be applied in the spring at the beginning of fly season. An application after manure removal will reduce fly buildup that usually follows the house clean out. A second application should be made six weeks later. Also treat outside the poultry house around openings and on shrubs and other plants where flies rest.

There are many tools for use in poultry houses such as ULV aerosol generator spraying, stationary building atomizers, baits, resin strips and fly belts, and portable mechanical foggers or misters that can be used for fly control.

Other pests of the chicken

Northern fowl mite

Galleryhip.com

The Northern fowl mite or feather mite is a very important external parasite of poultry with heavy populations capable of reducing egg production up 10 to 15 percent.

Mites can annoy egg handlers and other persons. Mites are often first noticed on the eggs. Check for mites first on the vent, then tail, back and legs of layers. Feathers become soiled from mite eggs, dried blood from feeding and excrement.

The entire life cycle is completed on the bird and consists of the egg, larva, nymph stages and adult. The eight-legged adult is about 1/26 inch long and dark in color. The entire life cycle can be completed under ideal conditions within a week.

With early detection, only a part of the caged-layer house may need treated. Monitor weekly at least 10 randomly selected birds from each row in the entire house. Mite population will increase in cooler weather.

Lice

Clemson University USDA Extension Bugwood.org

The chicken body louse can decrease egg production in caged layer hens. The skin of infested birds becomes irritated and red with formations of localized scabs and blood clots. In addition to feeding on skin fragments, feathers and debris, lice can attach to young quill feathers feeding on blood.

Although found naturally infected with the virus of Eastern Encephalomyelitis, it is not considered and important vector.

Adult chicken lice are flat-bodied, yellowish colored, 1/16 inch long with chewing mouthparts.

Chicken mite

Whitney Cranshaw Bugwood.org

The chicken mite sucks blood from poultry at night and remains secluded during the day in cracks and crevices. The poultry can have numerous weight gains and egg production can be decreased. These mites can barely be seen without a magnifying glass.

The life cycle may be completed in seven to ten days during warm weather and inactivity during cold weather.

Bed bug

Bugwood.org

The common bed bug occasionally attacks poultry. It is a blood-sucking parasite. It hides in cracks within the housing during the day and feeds mostly at night on blood while the host is asleep.

This causes small, hard, swollen, white welts which become inflamed and itch severely. It is rarely seen on poultry during daylight hours. An infestation can sometimes be recognized by blood stains and dark spots of excreta.

The adult is reddish-brown, oval-shaped, flattened and about ¼ to 5/8 inch long. There may be three or more generations per year.

There has been research conducted by many universities and others to verify whether the bed bug is a vector of disease. Currently there is no evidence indicating that the bed bug is a vector of disease to either humans or animals.

Flea

Pest & Disease Library Bugwood.org

Occasionally, the flea is found in the poultry house. It is usually first noticed in the litter where a wide range of hosts are attacked including rats, mice, chickens, humans, etc. The adult flea is an excellent jumper.

Their life cycle consists of the egg, larva, pupa and adult which can vary from two weeks to eight months depending on temperature, food and species.

The most common flea in Ohio is the cat flea; the adult is 1/16 to 1/8 inch long. It has a dark reddish-brown color, is wingless, hard-bodied, has three pairs of legs and is flattened vertically.

Darkling beetle

The Darkling or lesser mealworm is a nuisance in the poultry operation. Large populations of beetles sometimes migrate into nearby residential areas, especially during litter clean out. Although beetles can fly up to one mile, most crawl at night from disposed litter to neighboring fields and homes.

Beetles are frequently associated with poultry feed, preferring grain and cereal products that are damp, moldy and slightly out of condition. Both adults and larvae consume poultry feed in amounts costly to the producer. Larvae are known as lesser mealworms.

Patrick Marquez, USDA
Aphis PPQ Bugwood.org

Increased importance has been placed on control of this beetle. Both adults and larvae act as reservoirs for many poultry pathogens and parasites. Scientists have been able to transmit the causative agent of acute leucosis (Marek's disease) in chickens with this beetle. Positive confirmation of the transmission has been made under both laboratory and field conditions.

Marek's disease usually affects birds between three and four months old. Symptoms are characterized by various degrees of paralysis, most easily observed in the legs and wings. Droopy wings, gasping, loss of weight, paleness and sometimes diarrhea are also symptoms. Birds severely affected may be found lying on their sides with one leg stretched forward and the other held behind. The disease affects both broiler and egg laying types of poultry. Losses can reach percentage of the flock per day; mortality may exceed 30 percent of the flock within a few weeks.

Acute leucosis is highly contagious and has been shown to be airborne. Contamination may persist in the environment because the darkling beetle may serve as a reservoir for residual contamination. Beetles have been observed feeding on carcasses of poultry infected with leucosis and it appears that beetles may become contaminated in the process. Adult beetles are capable of retaining the contamination and transmitting the leucosis when eaten by chickens, as some research indicates. Other diseases that are spread include the causative agents of avian influenza, salmonella, fowl pox, coccidiosis, botulism and Newcastle disease. They also are vectors of cecal worms and avian tapeworms.

In the poultry house, the beetle can lay up to 800 eggs in litter during a 42-day period. Eggs develop into larvae in four to seven days. The life cycle requires about 42 to 97 days depending on temperature. Beetles live up to three months to a year. Adults are black or very dark reddish-brown and about ¼ inch long. Larvae are yellowish-brown, up to ¾ inch long and accumulate in dark corners of manure or litter, especially under sacks, in bins or in places where feed is stored. Pupation occurs in the litter, soil and side walls of poultry houses. They migrate frequently throughout the litter generally coming in soil contact. Adult chickens and chicks are more likely to eat the beetles and their larvae than poults or turkeys. Consumption of beetles and larvae, rather than providing "extra protein" in the diet, actually has a negative effect on feed conversion and rate of gain according to research.

Hide beetle

Mature larvae of the hide beetle have a habit of boring into various hard surfaces to pupate, usually preferring softwoods. Some may climb 24 to 36 feet and bore into wood posts, studs and rafters, seriously weakening and "honeycombing" these structures.

Larvae are especially troublesome in poultry houses, damaging yellow pine, foam insulation, styrofoam, air baffle boards, paneling, drywall and even PCP (Penta Ready) chemically treated wood in some cases. Larvae emerge from the litter, climb the walls and bore into soft building material, often escaping cannibalism during the pupation period.

Joseph Berger – Bugwood.org

Hide beetles are larger than darkling beetles, about 1/3 inch long, dark brown on top, with a mostly white undersurface.

Each female lays about 135 eggs, which hatch in 12 or more days. The life cycle requires 40 to 50 days. Larvae are thickly covered with long, brown hairs, grow to about ½ in long and have two spines at the terminal end of the abdomen.

Hide beetles can be managed by applying insecticides and dusts. Apply dusts with electrostatic duster as to negatively charge the particles, providing better adhesion to the wall surface.

CHAPTER 5

Learning Objectives

- Pests of sheep and goats
- How the animals are affected

Sheep and Goats

The insects and related pests that attack sheep and goats include:

Sheep ked

The sheep ked adult is a wingless fly which spends its entire life cycle on sheep. It is occasionally found on goats. The ked life cycle is unique. A single egg hatches within the female ked uterus. The resulting larvae develop to maturity in about 8 days. The nearly mature larvae are deposited on wool stands, where they pupate and an adult emerges in two to three weeks. The adult and begins to feed on blood soon after emergence.

The ked feeding activity produces an intense irritation leading to scratching, rubbing and biting of infested areas. Sheep infested with large number of keds become anemic and have reduced weight. Blue tongue is a viral disease transmitted to sheep from the ked. The sheep ked reduces efficiency of sheep and causes a damaging hide condition called "cockle". This condition, also called "rib cockle" is thought to be allergic reactions to salivary secretions of the feeding sheep ked. Results of this condition are scattered, dense, brownish nodules in the grain layer of sheep skin. This seriously downgrades both the grain and suede types of leather. The nodules cannot be flattened out and are impenetrable to dyes, leading to significant economic losses of several million dollars for the leather industry in the US per year. Elimination of the keds will allow for the skin to recover from the bites and the pelts will become usable again.

Melophagus.com

Apply insecticides as sprays, dusts or dips. Application at shearing gives the most efficient control.

Sheep lice

Sheep and goat lice cause:

- Intense skin irritation, resulting in reduced quality and quantity of fleeces,
- Blood loss, resulting in anemia

NSW.gov.AU

Lice are transmitted from infected sheep to uninfected sheep by contact. Insecticides applied as dips, sprays or dust will provide louse control.

Agric.wa.gov.au

Sheep scabies

This pest is under Federal quarantine regulations. Animals suspected of having scabies should be quarantined and a veterinarian consulted.

Nose bot

Eggs are deposited in or around the nose of sheep and goats. The eggs hatch and the larvae migrate to head sinuses. They cannot complete their life cycle without parasitizing their hosts.

At maturity, they migrate back down the nasal passages and drop to the ground. Once on the ground they bury themselves and pupate.

Migration of the larvae irritates the nasal membranes of the sheep which is often followed by a secondary infection.

coleop123narodru.

One to two months later adult flies emerge and the process starts again. Usually there are not more than two generations per year.

Wool maggot (black blow fly larvae)

This fly lays eggs in dirty wool or on wounds.
After hatching, the fly maggots spread over the animal and feed on dead tissue under the fleece. Their damage sometimes causes death.

Early shearing and medication of wounds before blow fly season is an effective preventive measure. Clipping and cleaning the fleece will help prevent infestations. Insecticide sprays, dips or smears are effective in controlling this pest.

Spinose ear tick

This is the only tick which normally poses a problem to sheep. Its feeding on the inner folds of the ear produces much discomfort and results in breaking down the ears. This tick can be controlled by applying insecticide dusts or liquid insecticides in oil to the inner folds of the ear.

CHAPTER 6

Learning Objectives
- Pests of swine
- How swine is affected by pests

Swine

Flies
Most flies that are pests of cattle are also pests of swine. Refer to the description and control recommendations in the cattle section.

Hog lice
Lice spend their entire life on the animal. They hatch from eggs deposited on the hair. The hog louse at 3/8 inch in length is the largest blood-sucking louse infesting domestic animals. Winter is the time when most lice infestations occur, but they may be found throughout the year.

Cals.ncsu.ecu

Excessive scratching and rubbing may indicate the presence of hog lice. Damage is primarily from irritation, making hogs restless, decreasing feed intake and growth rate. Anemia can occur in young pigs. The hog louse is capable of transmitting swine pox and other diseases. Lice are found primarily on the inside upper leg, around the tail and on the ears or neck. The life cycle of the hog louse takes 25-30 days to complete. Transmission is via direct contact with infested animals.

Insecticidal spray or pour-ons can successfully control hog lice. Dust formulations can be used on young and mature pigs and as a bedding treatment. Repeated periodic treatments are often needed for effective control.

Mange mites
Hog mange is caused by tiny parasitic mites that burrow into the skin to feed and lay eggs. The burrowing activity causes intense irritation. Animals rub and scratch to relieve the irritation. Infested animal hides can be cracked and bloody. Mange is mainly a problem in cold weather. Mange is highly susceptible and can spread rapidly from infected animals.

University of Copenhagen

Treatment with insecticidal sprays provides effective mange control as long as treatment is thorough. Dust formulation used for young and mature pigs can also be used for bedding.

Richard Jakowski, DVM,PHD

Good management is essential to prevent rapid spread. Routine treatment will prevent outbreaks. Programs for mange control should include treatment of pigs at weaning, sows one month before farrowing, boars prior to breeding season and all incoming hogs during the fall and winter months. If a mange outbreak is detected, treat the entire herd even though certain animals may appear unaffected.

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